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ABSTRACT

Previous research has shown that ethnic background impacts scores on measures of psychological functioning. False positives and false negatives may be obtained as a function of cultural differences. This paper examines the Acculturation Rating Scale for Mexican Americans (ARSMA), an instrument that might be used clinically to augment interpretation of measures such as the Minnesota Multiphasic Personality Inventory. The ARSMA consists of 20 questions measuring preferences and behavioral tendencies on a five-point continuum from Mexican to Anglo orientation. Questions were selected to reflect five elements of acculturation: language familiarity and usage, ethnic pride and identity, ethnic interaction, cultural heritage, and generational proximity. The instrument was administered to 450 college freshmen, of whom 352 were Mexican-American according to surname and self-report. Confirmatory factor analysis evaluated the fit of the data to six alternative four-factor models extrapolated from previous research and theoretical expectations. The results suggest that the constructs measured by the ARSMA are substantially correlated, and that the measure may have a more parsimonious structure than that suggested by previous studies using less sophisticated methods. This paper contains 24 references and 7 statistical tables. (Author/SV)

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A CONFIRMATORY FACTOR ANALYSIS OF THE
ACCULTURATION RATING SCALE FOR MEXICAN-AMERICANS

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ABSTRACT

Previous research has shown that ethnic background impacts scores on measures of psychological functioning. Cultural differences can yield false positives and false negatives as a function of such differences. The present investigation examined the Acculturation Rating Scale for Mexican Americans (ARSMA), a measure which might be used clinically to augment interpretation of measures such as the Minnesota Multiphasic Personality Inventory. It is not sufficient to assume that every Mexican-American is identical with respect to acculturation and the resulting impacts of acculturation on personality measures. The results suggest that the constructs measured by the ARSMA are substantially correlated and that the measure may have a more parsimonious structure than that suggested by previous studies using less sophisticated methods.

Previous research has shown that ethnic background impacts scores on measures of psychological functioning. Cultural differences can yield false positives and false negatives as a function of such differences. Therefore, in recent years considerable attention has been given to examining the impact of cultural variables on measures of the psychological and physical health of ethnic minority populations (Lorenzo, 1989; Nanjundappa & Frilis, 1988). Acculturation, the process by which an immigrant's attitudes and behaviors change toward those of the dominant cultural group as a result of exposure to the new cultural system, has been identified both as a source of stress as well as a factor affecting psychological diagnosis and treatment for Hispanic populations (Rogler, Malgady, Costantino & Blumenthal, 1987). For example, current mental health surveys of Mexican Americans have identified acculturation as a potential influence on psychological adjustment (Escobar, Karno, Burnam & Hough, 1988).

Montgomery, Arnold and Orozco (1990, p. 340) reported that age is an important influence on scores on the Minnesota Multiphasic Personality Inventory (MMPI), one important measure of psychological functioning, but that "these results also show that level of acculturation is an even more significant moderator variable." Montgomery and Orozco (1985) reported differences in MMPI scores on 10 of the 13 MMPI scales, but that use of age and acculturation scores as covariates resulted in only two of the scales yielding statistically significant differences. These results suggest the potential influence of acculturation on

psychological measures and the potential benefits from considering such influences during clinical work.

However, it is not sufficient to assume that every Mexican-American is identical with respect to acculturation and the resulting impacts of acculturation on personality measures. The quantification of cultural variables continues to be a major problem. Thus, recent reviews of behavioral science research with Hispanics reveal a movement toward defining and measuring cultural variables such as acculturation in Hispanic groups (Amaro, Russo & Pares-Avila, 1987; Baezconde & Padilla, 1988; Cuellar, Harris, & Jasso, 1980). Instrument development in the area of acculturation has evolved from the use of a single index, such as language usage as a measure of acculturation, to use of instruments that take into account sociocultural characteristics such as nationality, language, and occupational status (Mercer, 1976). More recently, behavioral and psychological variables have also been incorporated into acculturation scales (Padilla, 1980; Szapocnik & Kurtines, 1980).

The measurement of acculturation has been difficult due to the presence of cognitive, behavioral, and attitudinal components. In addition, acculturation is said to be multidimensional in that it can occur in two directions--biculturally--as cultural groups move toward or away from each other (Olmedo, 1979). Consequently, the types of constructs measured, the types of items, and the populations sampled have varied in studies exploring acculturation measurement. In an effort to empirically define the concept of

acculturation, a number of scales have been developed for Hispanics of Mexican descent residing in the southwestern United States (Cuellar et al., 1980; Olmedo, Martinez & Martinez, 1978).

The Acculturation Rating Scale for Mexican Americans (ARSMA) developed by Cuellar, Harris and Jasso (1980) was designed to assess level of acculturation in psychiatric as well as normal populations of Mexican Americans. The ARSMA was intended for practical use with Mexican Americans of varying socioeconomic, educational, and linguistic levels and for use with clinical populations.

An acculturation rating scale that can be applied to normal and clinical populations would be useful in assessment and in increasing our understanding of the impact of cultural variables on psychological adjustment. Research on the psychometric properties of the ARSMA has been limited to a few studies (Cuellar et al., 1980; Montgomery & Orozco, 1984) and have not employed confirmatory model-testing analyses. The purpose of the research reported here was to examine the psychometric properties of the ARSMA using such methods. Specifically, the following questions were posed:

1. To what extent does the factor structure of the ARSMA conform to the theoretical construct?
2. Do alternative rival factor models also fit response data on the ARSMA?

Method

Subjects

Data were obtained from students enrolled in freshman-level

general elective courses at a university in southern Texas. Of the 450 subjects (Montgomery, Arnold & Orozco, 1990), 352 (240 women, 110 men) were Mexican American according to surname and self-report, and 98 (68 women, 30 men) were Anglo American according to surname and self-report. Both subject groups were included in these analyses to increase item variance and the stability of the resulting factors.

Instrumentation

The ARSMA consists of 20 questions to be scored on a five-point Likert scale ranging from Mexican oriented ("1") to Anglo oriented ("5"). Questions were designed to measure preference and behavioral tendencies or actual behaviors. Questions for the scale were selected to reflect five elements considered significant in the measurement of acculturation. These elements are: (a) language familiarity and usage, (b) ethnic pride and identity, (c) ethnic interaction, (d) cultural heritage, and (e) generational proximity. Previous research using exploratory factor analysis with ARSMA data isolated four uncorrelated factor dimensions underlying responses (Cuellar et al., 1980; Montgomery & Orozco, 1984).

Procedures

To obtain responses on the ARSMA, an adult male researcher entered each class and asked for volunteers. In a few cases, instructors offered a limited amount of extra credit toward course grades for student participation, but for approximately 30% of the subjects, participation was strictly voluntary. The purpose of the study was said to be to gain information about the degree of

acculturation of students at the university. The 20-item ARSMA was given to each student who volunteered to participate.

Analysis

Exploratory factor analytic methods are important in establishing the construct validity of measures (Gorsuch, 1983; pp. 350-351; Nunnally, 1978, pp. 111-112). However, confirmatory factor analytic methods are especially valuable because they minimize capitalization on measurement error. Unfortunately, confirmatory methods require relatively large sample sizes, such as those available in the present study, so researchers are not always able to use these methods (Baldwin, 1989).

Some researchers employing these methods fail to realize that confirmatory methods test the plausibility of a model or set of models, each of which may fit data in hand, and not whether the model is the one true or best model for the data. Thus, it is important to test the differential fit of alternative models.

In the present study three different sources were utilized to extrapolate models positing four-factor solutions: (a) the empirical results in exploratory factor analyses conducted by Cuellar et al. (1980); (b) the empirical results in exploratory analyses conducted by Montgomery and Orozco (1984); and (c) theoretical expectations formulated by subjective interpretation of item content. For each of these three models the fits to the data of both an uncorrelated factor model and a correlated factor model were evaluated, resulting in an evaluation of six models. The confirmatory analysis was conducted using the LISREL software

described by Jöreskog and Sörbom (1986).

Results

Table 1 presents the maximum likelihood solution for a model positing four uncorrelated factors, derived by consulting the Cuellar et al. (1980) results. The chi-square associated with this model was 1,525.66 (df = 170). The goodness-of-fit index for the model was .728. Since the standard errors for the parameter estimates presented in Table 1 were all less than .052, all the Table 1 estimates are several times their standard errors, and would thus be considered noteworthy. The modification indices (i.e., the improvement in chi-square resulting from setting an element in the model free to be estimated) for the interfactor correlation coefficients were all quite large, especially relative to the modification indices for the fixed elements of the factor matrix constrained to be zero by the model being tested. These modification indices are presented in Table 2.

INSERT TABLES 1 AND 2 ABOUT HERE.

Table 3 presents the maximum likelihood solution for a model positing four uncorrelated factors, derived by consulting the Montgomery and Orozco (1984) results. The model is very similar to the model test reported in Table 1, and the results are therefore quite similar. The chi-square associated with this model was 1,539.90 (df = 170). The goodness-of-fit index for the model was .726. All the Table 3 estimates are several times their standard errors, and would thus be considered noteworthy. The modification

indices (i.e., the improvement in chi-square resulting from setting an element in the model free to be estimated) for the interfactor correlation coefficients were all quite large, are comparable to those presented in Table 2, and are therefore not reported here.

INSERT TABLE 3 ABOUT HERE.

Table 4 presents the maximum likelihood solution for a model positing four uncorrelated factors, derived by subjective examination of item content. The chi-square associated with this model was 1,647.65 ($df = 170$). The goodness-of-fit index for the model was .720. Again, all the Table 3 estimates are several times their standard errors. Again, the modification indices for the interfactor correlation coefficients were all quite large, and are comparable to those presented in Table 2.

INSERT TABLE 4 ABOUT HERE.

Table 5 presents the maximum likelihood estimates of factor coefficients and the interfactor correlation coefficients (labelled "PHI") for a model positing four factors that are correlated, derived by consulting the Cuellar et al. (1980) results. The chi-square associated with this model was 729.99 ($df = 164$). The goodness-of-fit index for the model was .351. All the Table 5 estimates are several times their standard errors. The interfactor correlation coefficients reported in Table 5 ranged from .525 to .765.

INSERT TABLE 5 ABOUT HERE.

Table 6 presents the maximum likelihood solution for a model positing four factors that are correlated, derived by consulting the Montgomery and Orozco (1984) results. The model is very similar to the model test reported in Table 5, and the results are therefore quite similar. The chi-square associated with this model was 727.52 ($df = 164$). The goodness-of-fit index for the model was .852. All the Table 6 estimates are several times their standard errors. The interfactor correlation coefficients reported in Table 6 ranged from .547 to .790.

INSERT TABLE 6 ABOUT HERE.

Table 7 presents the maximum likelihood solution for a model positing four factors that are correlated, derived by subjective examination of item content. The chi-square associated with this model was 930.28 ($df = 164$). The goodness-of-fit index for the model was .815. All the Table 7 estimates are several times their standard errors. The interfactor correlation coefficients reported in Table 7 ranged from .503 to .774.

INSERT TABLE 7 ABOUT HERE.

Discussion

Mental health studies on Hispanics have illustrated that acculturation level can influence the effectiveness of mental health services and treatments (Pomales & Williams, 1989).

Acculturation level has been shown to influence behaviors such as alcohol consumption, tobacco smoking, and the utilization of mental health services (Caetano & Medina-Mora, 1988; Delgado, 1988; Lorenzo, 1989; Wells, Hough, Solding & Burnam, 1987). The present study employed factor analytic methods to explore the structure underlying responses on the Acculturation Rating Scale for Mexican Americans (Cuellar et al., 1980).

Factor analysis at once **both** tests measurement integrity and sheds light on underlying theory. As Gorsuch (1983, pp. 350-351, emphasis added) notes, "A prime use of factor analysis has been in the development of both the theoretical constructs for an area and the operational representatives for the theoretical constructs." Similarly, Hendrick and Hendrick (1986, p. 393) note that "theory building and construct measurement are joint bootstrap operations." Thus, it was anticipated that the present study would generate insight regarding the measurement integrity of the ARSMA and regarding the phenomenon of acculturation.

It is noteworthy that the previous exploratory factor analytic work reported by Cuellar et al. (1980) and by Montgomery and Orozco (1984) resulted in the formulation of virtually identical models. It is also noteworthy that the model tests grounded in previous empirical inquiry, albeit exploratory inquiry, generated better fits to the data than the models that were grounded in a subjective reading of item content.

However, the modification indices for the interfactor correlation matrices (e.g., the Table 2 results) were very large.

In fact, freeing the model so that the factors were allowed to be correlated resulted in dramatic improvements in the chi-square tests of the model, e.g., from 1,525.66 to 729.99. These results suggest that the model should posit correlated factors. Also, the interfactor correlation matrices (labelled "PHI") reported in Tables 5 through 7 indicate that the factors are all appreciably correlated with each other.

These results suggest that acculturation may involve discrete constructs that overlap substantially, or perhaps even a smaller subset of constructs. Such an interpretation would be supported by the modest goodness-of-fit indices associated even with the last three models. In a sense, the construct may have a simpler structure than that suggested in previous exploratory work (Cuellar et al., 1980; Montgomery & Orozco, 1984). This latter result suggests the utility of applying confirmatory methods. The nature of a more parsimonious construct remains to be elaborated in additional work with this important construct of acculturation. Further elaboration of acculturation phenomena ultimately may assist counselors and psychologists in their work with diverse ethnic groups.

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Table 1
Factor Matrix Estimated Using Maximum-Likelihood Solution
for an Uncorrelated Factor Model Based on Cuellar et al. (1980)

Item	LANGFAMU	ETHNICID	READWRIT	ETHNICIN
LUA1	0.798	0.000	0.000	0.000
LPA2	0.817	0.000	0.000	0.000
EIA3	0.000	0.844	0.000	0.000
EIA4	0.000	0.849	0.000	0.000
EIA5	0.000	0.852	0.000	0.000
EAA6	0.000	0.000	0.000	0.720
EAA7	0.000	0.000	0.000	0.847
EAA8	0.000	0.000	0.000	0.574
LPA9	0.764	0.000	0.000	0.000
LPA10	0.766	0.000	0.000	0.000
LPA11	0.723	0.000	0.000	0.000
GNA12	0.000	0.616	0.000	0.000
CMA13	0.000	0.000	0.539	0.000
CMA14	0.000	0.000	0.316	0.000
FPA15	0.417	0.000	0.000	0.000
LUA16	0.819	0.000	0.000	0.000
LUA17	0.000	0.000	0.834	0.000
LUA18	0.000	0.000	0.879	0.000
EPA19	0.000	0.654	0.000	0.000
EPA20	0.000	0.756	0.000	0.000

Table 2
Modification Indices^a Associated with the Factor r Matrix

	LANGFAMU	ETHNICID	READWRIT	ETHNICIN
LANGFAMU	0.000			
ETHNICID	207.160	0.000		
READWRIT	176.397	131.388	0.000	
ETHNICIN	131.005	160.383	70.426	0.000

^aA modification index is the improvement in χ^2 that will result if this model parameter is no longer constrained to be zero. For example, the χ^2 for the original model was 1,525.66 with df equal to 170. If the correlation between Factors I and II is no longer constrained to be zero, the χ^2 will improve by 207.160, i.e., the new χ^2 with df = 170 - 1 = 169 will be 1,525.66 - 207.160 = 1,318.500.

Table 3
Factor Matrix Estimated Using Maximum-Likelihood Solution for
an Uncorrelated Factor Model Based on Montgomery & Orozco (1984)

Item	LANGUAGE	ETHNICID	FRIENDSE	CONTACTM
LUA1	0.793	0.000	0.000	0.000
LPA2	0.814	0.000	0.000	0.000
EIA3	0.000	0.844	0.000	0.000
EIA4	0.000	0.849	0.000	0.000
EIA5	0.000	0.852	0.000	0.000
EAA6	0.000	0.000	0.747	0.000
EAA7	0.000	0.000	0.803	0.000
EAA8	0.000	0.000	0.599	0.000
LPA9	0.767	0.000	0.000	0.000
LPA10	0.773	0.000	0.000	0.000
LPA11	0.728	0.000	0.000	0.000
GNA12	0.000	0.616	0.000	0.000
CMA13	0.000	0.000	0.000	0.539
CMA14	0.000	0.000	0.000	0.316
FPA15	0.000	0.000	0.412	0.000
LUA16	0.816	0.000	0.000	0.000
LUA17	0.000	0.000	0.000	0.834
LUA18	0.000	0.000	0.000	0.879
EPA19	0.000	0.654	0.000	0.000
EPA20	0.000	0.756	0.000	0.000

Table 4
Factor Matrix Estimated Using Maximum-Likelihood Solution for
an Uncorrelated Factor Model Subjectively Derived from Items

Item	LANGUAGE	ETHNICIN	ETHNICPR	GENERHER
LUA1	0.815	0.000	0.000	0.000
LPA2	0.814	0.000	0.000	0.000
EIA3	0.000	0.000	0.859	0.000
EIA4	0.000	0.000	0.825	0.000
EIA5	0.000	0.000	0.846	0.000
EAA6	0.000	0.720	0.000	0.000
EAA7	0.000	0.847	0.000	0.000
EAA8	0.000	0.574	0.000	0.000
LPA9	0.736	0.000	0.000	0.000
LPA10	0.751	0.000	0.000	0.000
LPA11	0.711	0.000	0.000	0.000
GNA12	0.000	0.000	0.000	0.448
CMA13	0.000	0.000	0.000	0.717
CMA14	0.000	0.000	0.000	0.608
FPA15	0.424	0.000	0.000	0.000
LUA16	0.822	0.000	0.000	0.000
LUA17	0.687	0.000	0.000	0.000
LUA18	0.641	0.000	0.000	0.000
EPA19	0.000	0.000	0.669	0.000
EPA20	0.000	0.000	0.767	0.000

Table 5
Factor Matrix Estimated Using Maximum-Likelihood Solution
for a Correlated Factor Model Based on Cuellar et al. (1980)

Item	LANGFAMU	ETHNICID	READWRIT	ETHNICIN
LUA1	0.831	0.000	0.000	0.000
LPA2	0.828	0.000	0.000	0.000
EIA3	0.000	0.845	0.000	0.000
EIA4	0.000	0.830	0.000	0.000
EIA5	0.000	0.827	0.000	0.000
EAA6	0.000	0.000	0.000	0.834
EAA7	0.000	0.000	0.000	0.729
EAA8	0.000	0.000	0.000	0.556
LPA9	0.748	0.000	0.000	0.000
LPA10	0.738	0.000	0.000	0.000
LPA11	0.700	0.000	0.000	0.000
GNA12	0.000	0.609	0.000	0.000
CMA13	0.000	0.000	0.521	0.000
CMA14	0.000	0.000	0.315	0.000
FPA15	0.442	0.000	0.000	0.000
LUA16	0.814	0.000	0.000	0.000
LUA17	0.000	0.000	0.872	0.000
LUA18	0.000	0.000	0.847	0.000
EPA19	0.000	0.676	0.000	0.000
EPA20	0.000	0.797	0.000	0.000

PHI

	LANGFAMU	ETHNICID	READWRIT	ETHNICIN
LANGFAMU	1.000			
ETHNICID	0.765	1.000		
READWRIT	0.721	0.628	1.000	
ETHNICIN	0.696	0.762	0.525	1.000

Table 6
Factor Matrix Estimated Using Maximum-Likelihood Solution for
an Correlated Factor Model Based on Montgomery & Orozco (1984)

	LANGUAGE	ETHNICID	FRIENDSE	CONTACTM
LUA1	0.830	0.000	0.000	0.000
LPA2	0.828	0.000	0.000	0.000
EIA3	0.000	0.845	0.000	0.000
EIA4	0.000	0.829	0.000	0.000
EIA5	0.000	0.826	0.000	0.000
EAA6	0.000	0.000	0.810	0.000
EAA7	0.000	0.000	0.716	0.000
EAA8	0.000	0.000	0.569	0.000
LPA9	0.751	0.000	0.000	0.000
LPA10	0.744	0.000	0.000	0.000
LPA11	0.704	0.000	0.000	0.000
GNA12	0.000	0.608	0.000	0.000
CMA13	0.000	0.000	0.000	0.521
CMA14	0.000	0.000	0.000	0.315
FPA15	0.000	0.000	0.475	0.000
LUA16	0.814	0.000	0.000	0.000
LUA17	0.000	0.000	0.000	0.873
LUA18	0.000	0.000	0.000	0.846
EPA19	0.000	0.677	0.000	0.000
EPA20	0.000	0.797	0.000	0.000

PHI

	LANGUAGE	ETHNICID	FRIENDSE	CONTACTM
LANGUAGE	1.000			
ETHNICID	0.757	1.000		
FRIENDSE	0.713	0.790	1.000	
CONTACTM	0.719	0.628	0.547	1.000

Table 7
Factor Matrix Estimated Using Maximum-Likelihood Solution for
an Correlated Factor Model Subjectively Derived from Items

	LANGUAGE	ETHNICIN	ETHNICPR	GENERHER
LUA1	0.833	0.000	0.000	0.000
LPA2	0.819	0.000	0.000	0.000
EIA3	0.000	0.000	0.849	0.000
EIA4	0.000	0.000	0.825	0.000
EIA5	0.000	0.000	0.825	0.000
EAA6	0.000	0.832	0.000	0.000
EAA7	0.000	0.730	0.000	0.000
EAA8	0.000	0.559	0.000	0.000
LPA9	0.731	0.000	0.000	0.000
LPA10	0.730	0.000	0.000	0.000
LPA11	0.693	0.000	0.000	0.000
GNA12	0.000	0.000	0.000	0.762
CMA13	0.000	0.000	0.000	0.478
CMA14	0.000	0.000	0.000	0.393
FPA15	0.443	0.000	0.000	0.000
LUA16	0.810	0.000	0.000	0.000
LUA17	0.697	0.000	0.000	0.000
LUA18	0.650	0.000	0.000	0.000
EPA19	0.000	0.000	0.678	0.000
EPA20	0.000	0.000	0.798	0.000

PHI

	LANGUAGE	ETHNICIN	ETHNICPR	GENERHER
LANGUAGE	1.000			
ETHNICIN	0.698	1.000		
ETHNICPR	0.774	0.770	1.000	
GENERHER	0.675	0.503	0.738	1.000